



Division of Agricultural Sciences  
UNIVERSITY OF CALIFORNIA

---

# **CITRUS FRUIT**

---

**FOR THE**

---

# **HOME ORCHARD**

---

**J. C. JOHNSTON**



CALIFORNIA AGRICULTURAL  
Experiment Station  
Extension Service

**CIRCULAR 409**  
REVISED



# Citrus

*Citrus fruits can be grown on home grounds over a large part of California. They can contribute substantially to your food supply, and with relatively little effort. They have excellent food value, and, unlike most fruits, can be stored on the trees over long periods without the loss of nutritional qualities.*

## **IF YOU NOW HAVE A HOME CITRUS ORCHARD—**

This circular tells you how to care for your trees for maximum production: irrigation, tillage, fertilization, pruning, disease and pest control, harvesting, and storage of the fruit.

## **IF YOU ARE THINKING OF PLANTING CITRUS TREES—**

The selection and management of young trees is described in the section starting on page 8. A list of available varieties, along with a description of their characteristics, starts on page 12. Use it as a guide for selecting home orchard trees.

---

### **THE AUTHOR:**

J. C. Johnston is Extension citrus specialist at the University of California, Riverside.

**REVISED DECEMBER 1953**



# Fruit for the Home Orchard

## • IRRIGATION •

Irrigation is the most important single factor in the care of citrus trees. The area of soil occupied by roots should be supplied with moisture at all times, but excessive use of water may cause root decay, especially if drainage is poor. Normal citrus trees extend their roots well beyond the area covered by foliage; a circle twice the diameter of the tree top will contain most of the roots. Irrigate all of this area except soil which comes into contact with the bark of the trunk. Keep this as dry as possible to avoid bark decay.

Water may be applied in furrows or basins or by sprinklers. The important thing is to wet as much of the root area as possible. If the soil or water contains injurious amounts of alkali, use either basins or sprinklers to prevent accumulations of salts in the soil. Enough water should be applied at each irrigation to wet all of the soil down as far as the roots go. In most soils this will be 3 to 4 feet and will require enough water to cover the soil 3 to 5 inches deep, less being necessary for a light, sandy soil than for

a heavy clay. Water penetration can be checked by digging a small hole 3 or 4 days after irrigation.

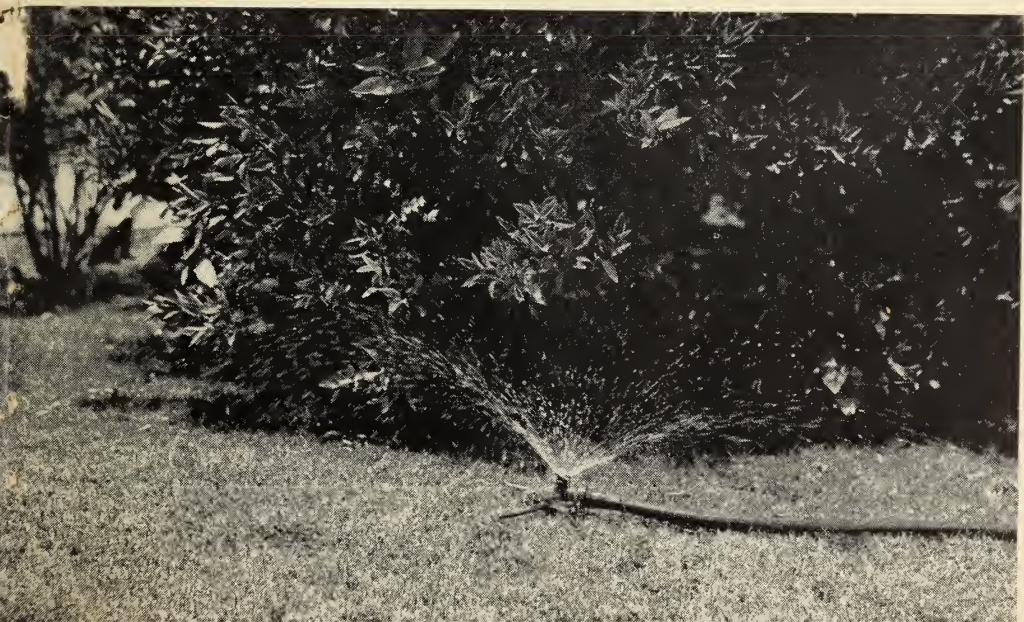
Water should be applied as often as the soil approaches dryness, less often on clay soil than on sandy soil and less often in spring and fall than in the heat of summer. *Never* irrigate *wet* soil. *Always* irrigate *dry* soil. In cool coastal areas, 4 or 5 irrigations per season will be enough; in hot interior areas, 7 to 10 will be needed. Continue irrigation in the fall until adequate rains occur.

When trees are situated on lawns, it is very difficult to irrigate properly. Grass has shallow roots and requires frequent light sprinkling. If care is used to give the grass only as much water as it needs and a heavy watering is given the trees at 3- to 6-week intervals, they may be kept in fairly good production.

## • FERTILIZATION •

Fertilization is necessary on most soils but fortunately the only element which is commonly lacking is nitrogen. This can be supplied by animal manures or by commercial fertilizers.

A lawn sprinkler offers the best way of irrigating citrus trees on the home grounds.



If poultry or rabbit manure is available, use 50 to 75 pounds per tree; spread it over all of the root area. If a good grade of cow manure is used, 100 to 200 pounds should be applied. Manures give best results if used in the fall or early winter, but can be used as produced if animals are kept on the premises.

The most desirable sources of nitrogen are such chemicals as sodium nitrate, calcium nitrate, ammonium nitrate, and ammonium sulfate. Use 5 to 10 pounds per tree and apply before spring rains are over—or, better still, divide this amount into 3 or 4 lots. Apply the first in January or February and the balance at about monthly intervals just before irrigation. All fertilizers should be spread evenly over all of the root area and not placed in piles or lumps. Where furrow irrigation is used, fertilizer applied after the rainy season should be spread in the furrow bottoms so it will be carried down by the water. Best results will be obtained if both manure and chemical nitrogen are used.

The only other element which citrus trees in home grounds are likely to lack is zinc. Zinc deficiency causes the nutritional disease known as mottle-leaf. The leaves become yellow between the veins and are smaller and smaller toward the end of the twigs. In severe cases, the ends of the limbs die back. Zinc can be supplied to the trees most economically by spraying it on the leaves. It can be used at any time, but late winter and early spring are the best periods. Zinc-bearing dusts can be used but are much less effective than sprays and are not recommended. To prepare zinc sprays, use 1 ounce of zinc sulfate and 1 ounce of washing soda per gallon of water. If washing soda is not available, use  $\frac{1}{2}$  ounce of hydrated lime instead. Another convenient and effective spray can be prepared by adding 1 ounce of zinc oxide to 1 gallon of water. Occasionally this spray causes a pitting of leaves, but fruit is not usually affected.

It is not necessary to drench the tree to get results, but some spray should reach all of the leaves. Three to 5 gallons will be ample for most mature trees.

Citrus trees may require fertilization with phosphate on certain soils. The extent of this deficiency has not been determined. The use of phosphate is not recommended except where local experience has demonstrated its value. Consult your County Farm Advisor for information.

## • PRUNING •

Pruning of citrus trees which are grown for fruit production should be confined almost entirely to the removal of dead and broken limbs. The removal of green leaves reduces the ability of the trees to bear fruit and should be avoided as much as possible.

For the sake of appearance and to facilitate tree care, all growth may be removed from the tree trunks. Enough growth should be removed from the center of the tree to facilitate fruit picking and pest and disease control. Citrus trees normally produce long, vigorous sprouts called suckers. If these are not well placed, they should be removed, but whenever possible they should be left to build up the tree. Pull them out to the sides of the tree to tame their wild growth and increase the leaf area of the tree. If left alone, they tend to fill the top and center of the tree with a tangle of brush.

Do not remove low-hanging branches; they bear fruit which is within easy reach, and shade the ground so weeds do not grow under the trees. The ideal tree has a skirt of foliage extending clear down to the ground.

Lemons need more pruning than oranges. With young lemon trees it may be desirable to remove or cut back some of the more vigorous shoots. A moderate annual thinning of mature trees will reduce the crop and improve the size and quality of the fruit.





This is the normal shape of a citrus tree. It is not necessary to prune to get this shape.

### • TILLAGE •

Weeds and grass compete with trees and should be kept under control, at least during the growing season. This may be accomplished by cultivating the soil, by keeping the weeds down with a hoe, or by a light spray of Diesel oil applied to the weeds.

Cultivation is injurious to soil and should be limited to the amount necessary to keep weeds under control, to make irrigation furrows or basins, and to cover manure or other fertilizer material. Avoid all deep tillage because it cuts roots. Remember that unlike annual crops, tree

roots grow in that part of the soil which is not tilled.

Keeping weeds under control by frequent hoeing avoids stirring the soil but involves a lot of hard work. An easier way to accomplish the same result is to spray the weeds with oil. A considerable area can be kept under control by this method with only a 2- or 3-gallon hand pressure sprayer. The soil is first prepared for irrigation and then as weeds come up 1 to 1½ inches in height, they are sprayed lightly with Diesel oil of the grade used in orchard heaters. Oil should be used sparingly and should not be permitted to touch the tree trunks. Injury

can be avoided if the weeds around the trunk are destroyed by hoeing. Apply the oil as a fine mist and use only enough to wet the weeds. Avoid letting it accumulate and run down the stems. Do not attempt to control heavy weed growth with oil; catch it young and keep it down. A number of proprietary weed-killing sprays are now on the market. If applied according to directions of the manufacturer, any one of them could be used effectively.

## • DISEASES •

The most common disease affecting citrus is scaly bark, a virus disease carried by buds when the trees are propagated. It causes rough scaly areas to develop on the trunk or main limbs. Small amounts of gum are usually produced in affected areas. These symptoms seldom appear until the trees are mature. Affected trees gradually decline in vigor and productiveness. No cure is known. In most cases the practical thing to do is to keep the trees until they are too weak to produce satisfactory crops and then destroy them. This disease is serious in orange, grapefruit, and tangerine trees but can be carried by all varieties of citrus. It can be avoided by planting trees from registered scaly bark-free parents.

Gummosis is a fungus disease which causes the bark to die, beginning in most cases at or near the ground level. Large amounts of gum usually flow from affected areas. The fungus which causes the disease (a species of *Phytophthora*) is present in practically all soils, but does not usually attack trees which have been properly planted and given good care. The disease occurs most often where wet soil remains in contact with the bark for some time. The disease is most common in heavy soils because they dry more slowly than light, sandy soils.

Cleopatra mandarin and trifoliolate orange are resistant to this disease and should be used as rootstocks in heavy soils and in wet locations. The bark on

roots is more resistant to attack than the bark on the trunk. That is why trees are planted so that the first roots branch out at the ground level. With trees already planted, the soil should be kept away from the trunk down to the level of the first roots. A thin wash of commercial Bordeaux powder mixed with water and applied to the trunk and exposed roots in the fall will give added protection.

If a tree becomes infected, remove the soil down as far as the bark is diseased and determine the extent of the injury. If the bark has been killed more than half of the way around the trunk, it will be best to remove the tree and plant a new one. If half or more of the bark is still sound, carefully remove the part which has been invaded by the fungus and one-fourth inch of sound bark around the margins. Bark which is alive may be yellow and gummy next to the wood. Remove only that which is brown and discolored. When the job is complete, disinfect the wound with one teaspoonful of potassium permanganate to a pint of water. Do not replace the soil.

When the bark shows signs of healing, cover the wound with any good wound compound.

The dropping of immature fruit is a common problem with citrus growers. Normally there is a fairly heavy drop of small fruit beginning shortly after the blossoms fall, and continuing until the fruit is half an inch or more in diameter. This is nature's way of adjusting the amount of fruit carried by the trees to their environment. The whole crop often appears to have fallen, when, in fact, a good set of fruit remains.

In cases where excessive drop occurs there may be a number of causes, the most important of which are lack of moisture or fertility, heavy pruning, and sudden changes in temperature. Insect infestation or injurious sprays used to combat insects are another common cause. Some of the fruit which falls is infected with a fungus called *Alternaria*. No way has been found



to control this disease, but it is seldom a serious matter.

In home orchards the fruit is often left on the trees long after it is mature. There is no better way to store fruit, but the continued maintenance of the old crop reduces the ability of the tree to bear fruit the following year and is a cause of reduced yields in many cases. Anything which injures or weakens the trees will decrease the set of fruit.

It is not always possible to avoid excessive fruit drop, but it can be kept to a minimum by giving the trees the best possible care. It is especially important to irrigate carefully, avoid excessive pruning and keep pests under control.

Quick decline is a virus disease which affects sweet oranges and grapefruit grown on sour orange and certain other rootstocks. The disease has few definite symptoms but is characterized by root decay which begins at the root tips and progresses back to the larger roots. This is accompanied by symptoms in the top which resemble those produced by gopher injury or gummosis. The tree may die within a few days after the first symptoms are observed, but more frequently the decline occurs over a period of several months. Sweet orange, mandarin orange and trifoliate orange are among the stocks which can be used for replanting where this disease is present. The County Farm Advisor, once again, is your best source of information as to symptoms.

## • PEST CONTROL •

Citrus trees are attacked by a wide variety of insects and other pests, and methods of control must be fitted to the pest or combination of pests as well as to the particular locality. It is therefore best to call or write your County Farm Advisor or Agricultural Commissioner about pest-control problems. The County Farm Advisor is the local representative of the University of California College of Agriculture and the United States Department

of Agriculture. The Agricultural Commissioner is head of the County Department of Agriculture and representative in the county of the California State Department of Agriculture. No general outline of methods will give satisfactory results. Communications will reach these agencies if addressed to your county seat.

## • FROST INJURY •

Citrus trees in many sections of California occasionally suffer serious injury from cold. It is impossible to determine the full extent of a severe injury for several months. In cases of severe injury to large trees, the dying back may continue during an entire season following a freeze. During this period little can be done and treatment should be postponed.

If only twigs and small limbs are killed, pruning may be done as soon as new growth indicates the extent of the injury. When trees have been killed back to heavy wood, no pruning should be done for 6 months to a year after the freeze. Sufficient time should always be given for new growth to take place and for the dying back to cease so that the extent of the damage is clearly defined. Earlier pruning usually results in leaving some limbs which will continue to die back, and the removal of limbs which would recover.

In the meantime, fruit which has no value should be removed and care should be used to limit the use of water to the needs of the tree. In cases of severe injury a reduced amount of fertilizer should be used.

## • HARVESTING •

Citrus fruits can be left on the tree for considerable periods of time without deterioration. Whenever possible this is the best method of storage. They are, however, subject to damage by wind and frost and eventually they become overripe and unpalatable. For this reason the fruit is sometimes picked and stored for future use. The fruit, if uninjured, is resistant

to decay and can be kept for several weeks if properly handled and stored. The longer the fruit remains on the tree after maturity, the shorter the time it can be kept in storage.

Citrus fruits which are to be stored must be harvested and handled with the greatest of care. Any break in the rind will open the way for decay organisms. Always wear soft gloves when picking or handling the fruit, for it is almost impossible to avoid cutting the rind with fingernails when bare hands are used. Do not pull the fruit from the tree, but clip the stem with a close, smooth cut. Rough or long stems puncture other fruits during handling. Use clippers with care, for clipper cuts and bruises are a frequent cause of decay. Avoid scratching the fruit on thorns or dead brush and do not drop the fruit when putting it into bags or boxes. When it is being transferred from one container to another, pour it carefully. See that all containers are free from twigs and gravel which might damage the rind. Pick the fruit when it is thoroughly dry. Wet fruit is more easily damaged than dry fruit.

### • STORAGE •

Citrus fruits keep best in cool rather than cold storage. Temperatures in the neighborhood of 60° F are satisfactory. Choose a place where the temperature is or can be held at a fairly uniform level.

Do not attempt to store fruit that has been injured; remove any that shows decay during storage. A few bad fruits will hasten deterioration in the whole lot. The less citrus fruit is handled the better it will store.

Place the fruit in convenient containers (clean wooden boxes are usually best) and get it into storage as soon as possible after picking and with a minimum of handling. Fruits may be stored bare or wrapped individually. Wrapping tends to isolate fruit which decays and prevents the withering that may occur if the air is too dry.

### • CHOOSING TREES •

Citrus trees are grown on a number of different rootstocks. The most desirable are sweet orange, suited to medium loam and sandy soils; and Cleopatra mandarin, suited to a wide range of soil conditions. Oranges may be grown on trifoliate orange root. On this stock most orange varieties are somewhat dwarfed, a very desirable characteristic for many home orchards. Sweet oranges on sour-orange stock may be destroyed by the virus of quick decline disease. Grapefruit on sour orange stock is also affected but to a lesser extent. For this reason, sour orange stock cannot be recommended for either oranges or grapefruit.

---

### Buy this . . .



This tree is less than two years old.



In the nursery the varieties are budded on suitable rootstocks and grown for one or two years. Either one- or two-year-old trees are satisfactory; older ones are likely to be culls and should be avoided. Well-grown one-year-old citrus trees should be  $\frac{1}{2}$  to  $\frac{3}{4}$  inch, and two-year-olds  $\frac{3}{4}$  to 1 inch in diameter, measured 1 inch above the union of the bud and the rootstock. The trees are sold balled, wrapped in burlap. Any on which the soil has been broken away from the roots by careless handling should be rejected.

Certain virus diseases which are not easy to detect in the nursery affect citrus trees. To avoid them make sure your nurseryman has used buds which have

been registered by the state nursery service as free from scaly bark.

Trees should be purchased from experienced and reliable nurseries, because in most cases it will be necessary to take the word of the nurseryman as to quality of the stock. Trees which are not acceptable to experienced growers are often left standing in the nursery until they are finally large enough to sell.

## • PLANTING •

Citrus trees do best on well-drained loam or sandy loam soils. With good care, though, they can be made to produce on almost any well-drained soil that does not contain injurious amounts of alkali. Planting can be done any time after the danger of frost has passed. Early planting is especially desirable in the interior areas, where sudden hot spells are likely to damage trees that are not well established. In most regions, April or May is a good time to plant.

In commercial orchards the trees are commonly planted 22 or 24 feet apart; in home grounds much closer planting is often desirable or necessary.

Holes for planting the trees need be only deep enough to accommodate the ball and wide enough to permit easy filling. If holes are unnecessarily deep, there will be excessive settling after planting. On poor soil it may be desirable to dig large holes and fill back with good top soil, but then the new soil should be allowed to settle 2 or 3 months before planting.

The balled trees are placed in the holes without removing the sacking. Plant them so that they will finally be a little higher than in the nursery, with 2 or 3 inches allowed for settling. Try to have the uppermost roots branch out at about ground level, after the trees have settled. These precautions are important because trees set too deep are likely to be killed by brown rot gummosis, which frequently develops where the soil comes into contact with the bark.

### ... Not this



Top-growth on this tree indicates advanced age.

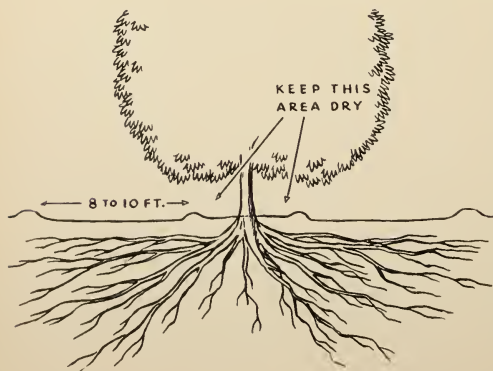
When a tree is properly placed, fill the hole three-fourths full of soil, and tamp it firmly around the ball. Next release the sacking which covers the ball, fold it back so as to expose the top of the ball, and complete filling the hole. Throw up a small basin around the tree and irrigate thoroughly. The bottom of the basin should slope toward the tree trunk, so that most of the water goes into the ball. As an added precaution against gummosis paint the lower 6 or 8 inches of the trunk with a Bordeaux wash. Use plenty, so that some of it soaks into the soil around the tree. Use Bordeaux powder and add water to make a mixture about as thick as paint.

To protect the trees from sunburn during the first year, wrap the trunks in several thicknesses of newspaper and tie loosely.

It is sometimes recommended that fertilizers be placed in the hole when the trees are planted. This practice has frequently resulted in severe damage to the trees. Fertilizers can be more safely applied to the surface of the soil after the trees have been planted.

## • CARE OF TREES •

The most important point in caring for young citrus trees is to see that they get plenty of water. Under most conditions, they should be watered every week or 10 days during the first year, and about every 2 weeks for the next 2 or 3 years.



After the third year, they will require irrigation every 2 to 6 weeks, according to the soil and the locality. On sandy soil or in hot weather, irrigation must be more frequent than on clay soils and in cool weather.

For the first year, the best way to apply water is in basins of about 2 feet in diameter around the trunk of the trees and deep enough to hold 3 or 4 inches of water. When the trees are established, water may be applied in furrows or basins or by sprinklers. After the first year, the basin should be enlarged and water should be kept away from the trunk of the trees as much as possible to avoid gum disease. This can be achieved with an inner circular ridge of soil around the trunk, and one to two feet from it.

Cultivation is necessary only to maintain irrigation furrows or basins and to control weeds and grass, which compete with the trees for water and fertility. It is not beneficial of itself and should be kept to a minimum.

Pruning young trees should be avoided as much as possible. The removal of green leaves retards growth and increases the time required for the trees to come into bearing. For the sake of appearance, growth which develops on the trunk of the trees should be rubbed off while young and succulent, but the tops can be left unpruned until the trees are in bearing.

Young citrus trees are likely to be damaged by frost and in most regions must be given protection for the first two or three winters. The most common method is to wrap the trunk and main branches in some material such as cornstalks. The wrapping should be 3 or 4 inches thick and snug enough to prevent free access of cold air to the trunk. It should cover only the trunk and main limbs. Be sure the wrapping makes good contact with the soil. Trees are fed by materials produced in green leaves in the presence of light. Therefore, if the leaves are covered or shaded, the tree is starved and becomes



more liable to cold damage. It is better to risk injury to the leaves by frost than to cover them and starve the tree. The wrapping should be examined occasionally to see that it remains in place.

When there are only a few trees, a cover can be thrown over them at night and removed during the day. On very cold nights, a lighted lantern or plumber's candle placed under the cover will give excellent protection.

On most soils, young citrus trees will grow more rapidly if given a fertilizer carrying nitrogen. Such sources as ammonium sulfate, sodium nitrate, calcium nitrate, and ammonium nitrate are good suppliers of nitrogen. Sprinkle a heaping tablespoon of chemical nitrogen in the basin around each tree three or four times during the season just before irrigation. Use double this amount the second season. The better grades of animal manures can be used with good results. Apply about a gallon three or four times during the season as directed above. In applying fertilizer to young trees, remember that the root system is small and excessive use of concentrated fertilizer will cause damage. Keep fertilizer from coming into direct contact with the tree trunk, and scatter it well in the basins.

Young citrus trees are especially susceptible to damage by aphids, thrips, and red spiders. Aphids are controlled by spraying with nicotine sulfate (1 tea-

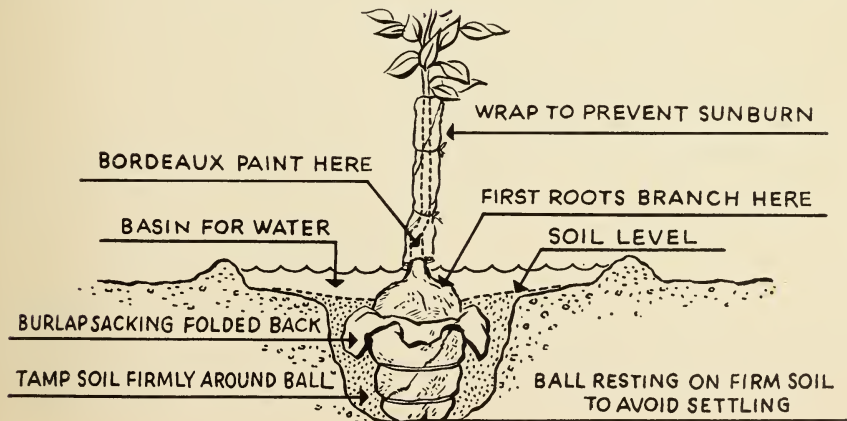
spoonful to 1 gallon of soapy water) or by dusting with a 10 per cent nicotine dust as often as they appear.

Thrips are light yellow insects about 1/30-inch long. They feed on young foliage and fruit and cause retarded growth, distorted foliage, and scarred fruit. They do not appear as pests in coastal areas. Thrips can be controlled by a spray of tartar emetic and sugar, or of nicotine sulfate and sugar.

Apply the material with an ordinary hand spray. Use 1 teaspoonful of tartar emetic and 2 teaspoonfuls of sugar to 1 gallon of water. For the nicotine spray, use 2 teaspoonfuls of nicotine sulfate and 2 teaspoonfuls of sugar to 1 gallon of water. Tartar emetic gives the most effective control, except in cases where the insects have acquired immunity to it.

Only very light coverage is necessary; 2 to 4 quarts will cover a mature tree. For best results make three applications: one when spring growth is about 2 to 3 inches long, one when the petals are falling (about May 10), and one in August.

Red spiders are common on citrus trees except in the hot interior districts. They are difficult to see but their work causes leaves and fruit to take on a light grayish-green color. This injury weakens the trees and may result in leaf and fruit drop and in reduced tree growth. For control, spray with a light-medium oil emulsion according to the manufacturer's directions.





---

# These are the Citrus

---

## • ORANGES •

**Washington Navel orange**—an early variety, maturing December to February, depending on location. Does not develop its best quality near the coast. The seedless fruit can be left on the tree from three to four months.

**Valencia orange**—a late variety of wide adaptation, maturing from April to June, according to location. The fruit can usually be left on the tree till September or October. In many areas, planting both Washington and Valencia will provide fruit the year 'round.

## • GRAPEFRUIT •

**Marsh grapefruit**—the only variety commonly grown in California. Fruit matures from late November to June, depending on location, and can be stored on the tree for several months. The quality of grapefruit grown in cool areas is generally not acceptable; it is at its best in the warm interior areas.

**Ruby grapefruit**—a variety with red flesh. Very similar to Marsh grapefruit, except for the red blush of the rind and rosy red flesh. Red or pink flesh grapefruit do not color well in most parts of California, and this variety is no exception.

## • LEMONS •

**Lisbon lemon**—vigorous, thorny, more resistant to cold than the Eureka lemon. Matures most of its fruit in the fall, but will furnish some fruit all year 'round.

**Eureka lemon**—usually bears fruit at all seasons. Especially good as a dooryard tree, though not as vigorous as the Lisbon. Does not do well on sour-orange root.

**Meyer lemon**—preferred by many for the home orchard. It is a smaller tree than either the Eureka or Lisbon lemon, and is more resistant to cold. It carries fruit during most of the year. This lemon is similar to the ordinary varieties, except that it is almost orange in color. It has a mild flavor, a pleasant aroma, and high juice content.

## • MANDARINS •

*The mandarins include a large group of loose skinned, highly flavored fruits. Some members are called Satsumas, others tangerines. They are all in the mandarin classification, however.*

**Satsuma mandarin**—includes several strains with very similar fruit. Particularly suited to the northern limits of citrus culture, it will stand more cold than most other citrus varieties, and will mature where summers are relatively cool. Not suited to the desert areas. Usually grown on sweet orange stock. Season is November to February, depending on location. The tree is small and thornless, rarely reaching a height of more than ten feet. Fruit is medium to small, and has few seeds. Rind is loose, bumpy, and yellowish orange in color. If left on the tree the fruit deteriorates rapidly after maturity, but can be picked and stored for a considerable length of time.



# Varieties Grown in California

**Dancy mandarin**—more commonly called Dancy tangerine—is the most popular variety in this group. The tree is vigorous and large for a mandarin. It is at its best in the desert, but is cold-resistant and can be grown under many conditions. Fruit is of medium size, with rind loose and reddish orange in color. Flesh is deep orange and excellent in flavor. Season is November to February, according to locality.

**Clementine or Algerian mandarin**—usually matures between Satsuma and Dancy. The tree is medium in size. Fruit is orange red, smooth, and also medium in size. It has few seeds, is of high quality, and can be left on the tree longer than most mandarin varieties.

**Kara mandarin**—a cross between the Satsuma and King mandarins. The tree

is vigorous, spreading, and fairly large. Fruit is medium size, with a loose rind colored a deep orange. The flavor is excellent and it is a good juice fruit, if slightly seedy. Well adapted to the warm interior areas. Season is January and February in the desert valleys and February-March to May-June at Riverside.

**Kinnow mandarin**—a cross between King and Willow Leaf mandarins. A vigorous upright variety. The fruit is yellowish orange and medium in size. Flavor is rich and somewhat less acid than Kara. This variety tends to produce most of its fruit in alternate years, and fruit size is often too small in heavy crop years. This can be overcome by pruning out some of the branches following a light crop. Desert valley season is December to February; Riverside, February-March to May.



The citrus family includes oranges, lemons, grapefruit, limes, mandarins, and many hybrids.

**Frua mandarin**—a cross between King and Dancy mandarins. The tree is medium in size, and somewhat lacking in vigor. The fruit is similar to Dancy but larger, and has fewer seeds. Its season is December to February, but varies with location. It does not do well in the desert, but thrives in the southern California navel orange areas.

**Dweet**—a cross between Dancy mandarin and Mediterranean Sweet orange. The tree is large and vigorous. The fruit is about orange size, deep orange in color, and somewhat pear-shaped. The rind is loose and tends to become lumpy at maturity. The fruit is too tender to eat out of hand, but is excellent for juice. Season at Riverside is March-April to May.

## • OTHER VARIETIES •

**Toroco**—a red-fleshed orange of good size and quality. While blood oranges generally do not color well in many parts of California, this variety develops very well. At Riverside it matures at mid-season. It is practically seedless. The juice is rich dark red.

**Kumquat**—closely related to citrus fruits. The tree bears small orange-like fruit  $\frac{3}{4}$  to 1 inch in diameter. The rind is sweet, the flesh sour. The fruit can be eaten fresh or as marmalade or jelly. They are frequently candied or preserved whole. The trees are small and can be grown as shrubs. They are excellent ornamentals. Common varieties are Meiwa, Nagami, and Marumi. Nagami fruit is oblong to slightly pear-shaped; Meiwa and Marumi are round. Palestine sweet lime and the Dorshapo sweet lemon. The lime is a vigorous, large tree. The Dorshapo tree is of medium size, and resembles the Eureka lemon.

**Mexican limes**—include a number of varieties. The trees are small and can

be grown as bushes. They are very susceptible to frost, and will survive only in the most favorable of locales. The fruit is highly acid, about an inch in diameter, and is round or oval.

**Bearss seedless lime**—the most popular lime variety in California. More hardy than the Mexican limes, but not as resistant as the lemon. The tree is of medium size, round and vigorous. The fruit is slightly smaller than most lemons, very acid, and has excellent flavor. It bears some fruit during most of the year.

**Sweet limes and lemons**—There are a number of limes and lemons that do not contain acid. They are popular in many tropical countries, but lack enough flavor for most tastes here. They are interesting novelties, and have value as a source of vitamin C for those who cannot use the acid citrus fruits. Most common varieties are the

**Tangelos**—the result of crossing mandarins and grapefruit. In general, they are highly flavored, and have the characteristics of both parents. Their behavior under varied growing conditions is not known at this time. The following are suggested for trial: Minneola, Seminole, Pearl, and Orlando varieties.

**Shaddock or Pummelo**—the largest citrus fruits grown. Many varieties have been introduced in the United States, but generally have not been adapted. A few of these have produced acceptable fruit, and some in the desert have been exceptional. The fruit has a thick rind, and the pulp is usually crisp and firm. Some can be eaten like grapefruit, but most are better sectioned and peeled. The flesh can be eaten with or without sugar, and is excellent in fruit salad. No recommendations as to varieties can be made at this time. They are not suggested for the cooler areas of the citrus region.



**For additional information**

consult the citrus specialists in the Farm Advisor offices listed below:

COUNTY	ADDRESS	TOWN
BUTTE COUNTY	P.O. Box 991 (P.O. Building)	Oroville
GLENN COUNTY	P.O. Box 737 (County Bldg. 607 Fifth St.)	Orland
KERN COUNTY	P.O. Box 791 (2610 M St.)	Bakersfield
LOS ANGELES COUNTY	808 North Spring St.	Los Angeles 12
ORANGE COUNTY	1104 West 8th St. (Santa Ana Community Center)	Santa Ana
RIVERSIDE COUNTY	P.O. Building	Riverside
SAN BERNARDINO COUNTY	566 Lugo Avenue (Co. Agr. Bldg.)	San Bernardino
SAN DIEGO COUNTY	Bldg. 1, P.O. Box P 4005 Rosecrans St.	San Diego 10
SANTA BARBARA COUNTY	P.O. Box 126 (Federal Bldg.)	Santa Barbara
TULARE COUNTY	P.O. Building	Visalia
VENTURA COUNTY	52 N. California St.	Ventura



## and this is what it looks like . . .

**T**HE PHOTO above is taken from a circular on irrigated pastures in California. It shows a good lay-out of fences and gates for rotation grazing.

The drawing below is from a circular on selective weed killers and shows one reason why some weed killers are selective.

These pictures are typical of the practical, down-to-earth approach

to farm problems used in many of the free publications put out by the University of California College of Agriculture.

In editing these publications, the rule is: tell it simply; if it can't be told simply, use a photograph; if a photograph won't show it, draw a picture.

The publications cover a wide variety of farm subjects, and their aim is to present useful information developed by the University's specialists, in a clear, easy-to-read manner.

Perhaps one or more of these publications will help YOU with your farm problems. For a catalog listing all of the publications available, see your County Farm Advisor or write to:



SPRAY BOUNCES OFF CEREAL LEAVES



SPRAY STICKS TO WIDER, HORIZONTAL LEAVES

OFFICE OF AGRICULTURAL PUBLICATIONS, 22 GIANNINI HALL, UNIVERSITY OF CALIFORNIA, BERKELEY 4, CALIFORNIA